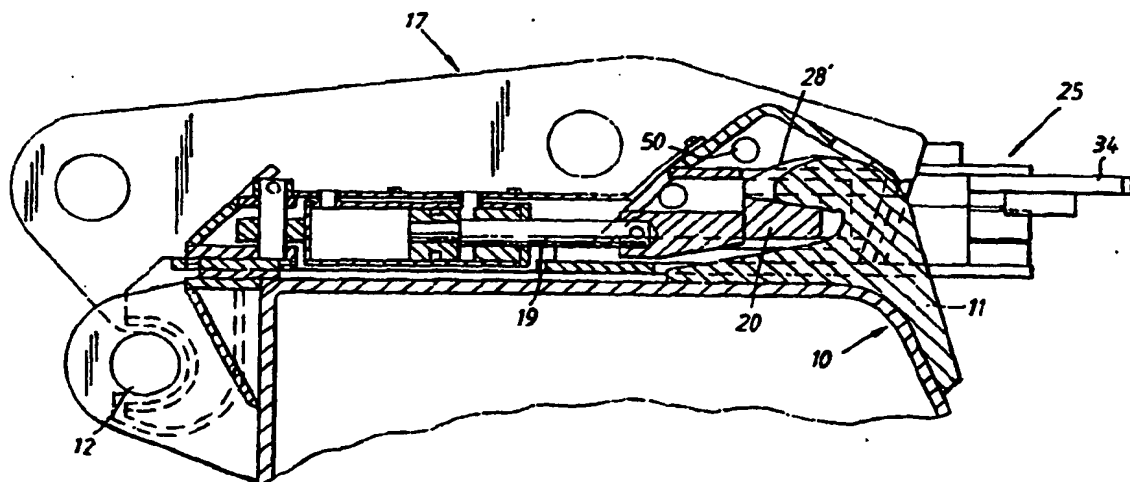




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(54) Title: ARRANGEMENT IN WORKING MACHINES



(57) Abstract

The invention relates to an arrangement pertaining to automotive, hydraulic working machines of the kind which include a movable arm or jib which carries a first (10) and/or a second (25) working implement either directly or indirectly through the medium of a quick-attachment means (17) provided with locking means (19, 20). At least the first implement, for instance an excavating bucket (10), includes coupling means (11, 12) for detachable locking coaction with the quick-attachment means. According to the invention, the second implement (25) is constructed so that it can be lockably connected on one side thereof to the first implement (10) or to a function element, and so that the opposite side thereof can be lockably connected to the quick-attachment means (17).

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ARRANGEMENT IN WORKING MACHINES

The present invention relates to an arrangement relating to automotive working machines equipped with an hydraulic system and being of the kind which include a movable arm or jib which carries a first and/or a second implement through the medium of a quick-attachment means provided with locking means, wherein at least the first implement, for instance an excavating bucket, includes coupling means for releasable locking coaction with the quick-attachment means.

Working machines of the aforescribed kind are often required to carry out different working functions, for instance excavating work with the aid of an excavating bucket and lifting work in which objects are lifted with the aid of a gripper. This latter function is now often performed with the aid of a so-called rototilt, i.e. a device which can operate through a working angle of 360°. In order to avoid wasting time in switching between different implements, for instance when changing a bucket for a gripper, prior publication SE-A-464,645 suggests an arrangement which enables the machine to carry a first and a second implement simultaneously, and which also enables these implements to be used independently of one another. However, this facility requires the gripper to have the form of a cassette-like unit which can be fitted between a bucket and a rototilt in a particular manner. This enables the gripper to be used irrespective of whether the bucket is connected or not.

With a starting point from an arrangement of the kind defined in the introduction, an object of the present invention is to provide an improved arrangement which will enable the numerical requirement of so-called quick attachment devices of known basic construction to be reduced when, for instance, a crane arm or jib is intended to carry a rototilt, gripper and bucket. This not only reduces the total weight of the structure, but also reduces the manufacturing costs.

This object is achieved, and also other objects, with an arrangement constructed in accordance with the invention and having the characteristic features set forth in Claim 1.

5 An arrangement of this kind is highly flexible. For instance, it enables the second implement to be connected between a quick-attachment means fitted on the machine arm and a function implement such as a rototilt, wherein the quick-attachment means and the second implement are able to form
10 a lockable assembly. In the case of the exemplified embodiment, in order to be able to use the second implement it is necessary in practice to remove the function implement, since its coupling means locks the second implement in a passive state.

15 Alternatively, one coupling side of the second implement can be connected detachably to the coupling means of a first implement, while the other coupling side is connected to a quick-attachment means (which may already be attached to a
20 working arm on the machine). In this case, the second implement is latched in an inactive position with the aid of locking means intended herefor. Only the first implement can then be used. In order to be able to use the second implement, it is first necessary to detach the first implement
25 from the aforescribed attachment. The quick-attachment means and the second implement can also form a dismountable assembly in this case.

30 According to another alternative, the second implement may be connected to the quick-attachment means on the function element (fixedly mounted), wherewith the second implement and the function element will form a lockable assembly in which the second working implement is able to function. It is assumed in this case that no further implement is connected.

35 In summary, the second implement is only able to function when no other implement is connected.

The invention affords the advantage that when several working implements are connected, the number of quick-attachments is reduced, thereby reducing the total construction height and lowering manufacturing costs, while obtaining the same mechanical performance as that of a machine which does not include the inventive concept.

The invention also affords the not unessential advantage of enabling all coupling work to be executed by the operator from the operator's cabin, in distinction to the known technique in which a gripper must be attached manually to the function element. A possible drawback with the invention is that the operator can only work with one of two implements connected. However, this slight drawback is counterbalanced by the ability of changing rapidly between implements in the absence of any manual work, as a result of the inventive arrangement.

Claims 2-4, in particular, provide a good picture of the flexibility of the inventive arrangement.

Remaining Claims define advantageous structural embodiments of the arrangement components, although one skilled in this art will realize that modifications can be made.

The invention will now be described in more detail with reference to a preferred exemplifying embodiment thereof and also with reference to the accompanying drawings, in which Fig. 1 is a perspective view from above of a first, known implement, namely an excavating bucket provided with known coupling means;

Fig. 2 is a view from above of a quick-attachment means of known basic construction;

Fig. 3 is a view from above of a second implement according to the present invention, constructed to achieve an important object of the invention;

Fig. 3a is a partially sectioned front view of the implement

shown in Fig. 3;

Fig. 4 is a partially sectioned side view of a bottom-mounted first implement, a second implement mounted above said first implement, and a top-mounted quick-attachment means;

Fig. 4a illustrates part of the connection in Fig. 4, but with the locking element of the quick-attachment means retracted to a position in which the first implement is released but in which the second implement and the quick-attachment means still form a locked assembly; and

Fig. 4b shows the locking element of the quick-attachment means fully retracted, so as to release the second implement.

The Figures of the drawings show only the mutual relationship between the first implement, the second implement and the quick-attachment means. Although not shown, it will be obvious to the skilled person that the illustrated quick-attachment means can be connected to or permanently mounted on a machine arm or a rototilt.

Fig. 1 illustrates the upper part of a first implement, in this case an excavating bucket 10, which is provided with coupling means in the form of a hook-like element 11, and a carrier shaft 12 which extends transversely to the longitudinal direction of the bucket. Flanges 13, 14 and 15, 16 form therebetween regions in which known hook-like elements on respective connecting devices are received.

Fig. 2 illustrates a quick-attachment means of known basic construction but which has been slightly modified and which is normally intended for connection with the coupling means of a working implement, for instance the bucket shown in Fig. 1. The quick-attachment means 17 includes the standard and well-known downwardly directed hook means at one end (not shown in the Figure) an elongated, outwardly open aperture

18 at the opposite end, and an hydraulic, longitudinally displaceable piston 19 whose front end is connected to a conical locking shoulder 20 which is intended to engage the hook-like element 11 (Fig. 1) and therewith form a first clamping point between the first implement (Fig. 1) and the quick-attachment means. At the opposite end, the hook-like element of the quick-attachment means 17 coacts with the carrier axle 12 of the first implement and therewith forms a second clamping point between said two elements. Although not shown, the two hook-like elements of the quick-attachment means have mutually facing peripheral recesses, the purpose of which will be explained below. The mutually opposing sides of the locking shoulder 20 have vertical flanges 21 which are provided with recesses 22 on the inner surfaces thereof. The locking arrangement 19-22 is guided between parallel walls 23. The quick-attachment means, as described above, has the form of a flat element adapted to the surface of the first implement. The reference numeral 24 identifies hydraulic lines which are connected to the hydraulic system of the machine in a manner not shown.

Fig. 3 is a view from above of an inventive attachment part which is preferably integral with a second implement, for instance a gripper. This attachment part, in the following referred to as the second implement, is referenced generally 25 in the drawing, and includes mutually opposite claw elements 36, 37 which in shape are similar to corresponding claw elements on the quick-attachment means 17 (Fig. 2) for coaction with coupling means (the shaft 12) on the first implement 10, or with corresponding coupling means on a function element, e.g. a rototilt (not shown). It is assumed in this case that the second implement 25 shall be connected detachably to the first implement (the bucket) shown in Fig. 1, and includes at its front end an elongated slot 26 having a transverse defining wall 27 and upstanding flanges 28, 29 which surround the slot 26 and extend in the longitudinal direction thereof. Each flange 28, 29 is provided in the

vicinity of its upper edge with a respective collar 30 and 31 for locking coaction with the recesses 22 in the quick-attachment means 17. The rearward parts of the flanges 28, 29 have a claw-like shape (see Fig. 4, reference 28') and lockingly accommodate the locking shoulder 20 on the quick-attachment means 17. Piston means 32, 33 are actively connected to gripping claws 34, 35 which are pivotal around axles 34' and 35' respectively. These gripping claws are shown in an inactive position in the Figure. In other respects, the rear part of the implement shown in Fig. 4 is provided with downwardly extending claw elements 36, 37 of a kind that can be used for coaction with a coupling shaft, for instance the shaft 16 shown in Fig. 1. Each of the claw elements has a respective collar 36' and 37' which coacts with a corresponding claw element on the quick-attachment means. In other respects, one surface, the lower surface, of the second implement 25, i.e. the combination comprised of an attachment part and a working implement, is configured to correspond to the coupling means on the other implement, for instance the bucket shown in Fig. 1. The hook-like element 11 on the bucket will thus lie between the flanges 28, 29 when the bucket is connected.

Fig. 3a is a cross-sectional view of the attachment and shows the gripping claws 34, 35 in their active positions. The Figure also shows part of the hook-element receiving slot 26. Spring-loaded (pressure spring) locking pins 40 and 41 are each guided individually for movement through a respective opening in guide flanges 28, 29. In the region of the pivot axle 34', 35', respective gripping claws 34, 35 have a curved guide element 34" and 35" with which respective gripping claws coact, said elements also having a locking recess 34''' (only one of which is shown in the drawing). When the gripping claws are activated (Fig. 3a) hydraulically, respective locking pins 40, 41 will slide up on their associated guide curve 34", 35" and force the locking pins to the position shown in Fig. 3a, i.e. force the pins to

enter the slot 26 and thereby prevent the slot from receiving a coupling device, for instance the hook 11 in Fig. 1, belonging to the first implement. When the gripping claws are in a passive position, i.e. are swung inwardly towards one another so as to overlap, the locking pins 40, 41 will be forced into respective locking recesses 34''' by the spring force acting thereon, so that the end parts of the pins will lie within respective bores in the wall 28, 29 and vacate the slot 26, which is therewith able to receive the hook element 11. If an attempt is made to activate the gripping claws 34, 35 when the first and the second implements are mutually connected, one end of respective locking pins will come into contact with the walls of the hook element 11 and therewith effectively latch the gripping claws 34, 35 against use. The gripping claws of the second implement can only be activated when the first implement is disconnected.

Fig. 4 is a longitudinal section view of a connected assembly which, seen from beneath, is comprised of the first implement 10, the second implement 25 and the quick-attachment means 17. As will be seen, in one position (Fig. 4), the locking element 19, 20 on the quick-attachment means 17 locks the implements 10 and 25 together to form a three-component assembly. In this position, or state, the gripping claws 34, 35 of the implement 25 are locked in a passive position, whereas the hook-like element on the bucket extends into the recess 26 on the second implement 25. The hook element 11 therewith makes activation of the gripping claws 34, 35 impossible (see Fig. 3a and associated text). When the first and second implements are connected together, only the function of the first implement 10 can be employed.

In Fig. 4a, the locking means 19, 20 of the quick-attachment means are shown retracted through a predetermined first distance, i.e. a distance in which the first implement 10 is released. The Figure clearly shows that the locking shoulder 20 has therewith been drawn out of engagement with the hook-

like element 11 on the first implement 10, although it still engages with the hook-like element 28' on the second implement 25. This predetermined first displacement-position of the quick-attachment locking means 19, 20 is achieved by inserting a reinforced hydraulic line through openings 50 in the mutually parallel side guides 23 of the quick-attachment means. In order for the locking means 19, 20 to be able to be fully retracted to the position shown in Fig. 4b, it is necessary to deactivate the hydraulic connection in a known manner, i.e. by removing the reinforced hydraulic line from the opening 50. It will be evident that when the implement 10 is disconnected, the recess 26 on said implement 10 will be free, therewith enabling the gripping claws 34, 35 to be activated, such that the locking pins 40, 41 can move freely into the recess 26.

CLAIMS

1. An arrangement relating to automotive, hydraulic working machines of the kind which include a movable arm or jib which carries a first and/or a second working implement through the medium of a quick-attachment means provided with locking means, either directly or indirectly through the medium of a function device for instance, wherein at least the first implement, for instance an excavating bucket, includes coupling means for detachable locking coaction with the quick-attachment means, characterized in that the second implement includes a connecting part provided with mutually opposing coupling means which on one side of the connecting part are complementary to and therewith detachably connectable to the coupling means of a first implement, for instance an excavating bucket, or a function element, such as a so-called rototilt, and whose coupling means on the opposing side are complementary to and therewith detachably connectable to the coupling means of the quick-attachment means, said arrangement being such that in one position the quick-attachment means and its associated locking element will function to lock the first implement to the second implement and therewith form an individually separable three-component assembly.
2. An arrangement according to Claim 1, characterized by means for preventing activation of the function device (gripping claw) of the second implement.
3. An arrangement according to Claim 1, characterized in that the first implement can be released from the three-component assembly while keeping the second implement and the quick-attachment means locked together.
4. An arrangement according to any one of Claims 1-3, characterized in that the quick-attachment means is connected to a machine arm or to a function element, for instance a so-

called rototilt.

5. An arrangement according to any one of the preceding Claims, wherein the coupling means of the first implement
5 includes a hook-like element, characterized in that the second implement is preferably integral with the attachment part, the gripping arrangement, and in that the attachment part includes a pair of mutually parallel and mutually spaced flanges which are intended to receive the hook-like element
10 therebetween.

6. An arrangement according to any one of the preceding Claims, characterized in that the gripping arrangement on the
15 second implement is controlled in a known manner through the hydraulic system of the machine; and in that when the first implement is connected to the second implement, the claws of the gripping arrangement are latched in a passive position by locking means.

7. An arrangement according to Claim 6, characterized in
20 that the locking means is comprised of a locking pin which is movably connected to one end of a respective claw of the gripping arrangement, wherein when the gripping arrangement is in a passive state the free end of each locking pin will
25 lie against a part of the coupling means of the first implement .

8. An arrangement according to any one of the preceding Claims, wherein the quick-attachment means includes a
30 conically shaped locking shoulder which is mounted on one end of a movable rod and which is adapted to coact with the hook-like element on the first implement, characterized in that the locking shoulder has on opposite sides thereof guide means adapted for coaction with the flanges on the attachment
35 part provided with said gripping arrangement.

9. An arrangement according to Claim 8, characterized in

that the locking shoulder and associated rod are guided in a means herefor.

10. An arrangement according to any one of the preceding Claims, and in particular to Claim 9, characterized in that the locking shoulder can be retracted to a first position in which the quick-attachment means and the second implement can be detached from the first implement in the form of a unit.

11. An arrangement according to Claim 9 and Claim 10, characterized in that a reinforced hydraulic line is passed through the rod and locking-shoulder guide means and forms thereby means for limiting movement of the rod.

12. An arrangement according to any one of the preceding Claims, wherein the coupling means on the first implement includes a carrier shaft which is intended for coaction with claws on the quick-attachment means and with the attachment part provided with said gripping arrangement, characterized in that the carrier shaft is constructed to support the claws of respective implements in pairs while pivotally guiding said claws.

13. An arrangement according to any one of the preceding Claims, characterized in that the flanges on the attachment part provided with said gripping arrangement project beyond the hook-like element and the first implement.

14. An arrangement according to any one of the preceding Claims, and particularly to Claim 12 in combination with Claim 8, characterized in that the side surfaces of the opposing coupling hooks on the quick-attachment means have mutually facing internal recesses intended for coaction with collared parts of the hook-like devices on the attachment part.

AMENDED CLAIMS

[received by the International Bureau on 16 May 1995 (16.05.95);
original claims 1-14 replaced by amended claims 1-9 (3 pages)]

1. An arrangement relating to automotive, hydraulic working machines of the kind which include a movable arm or jib which carries a first and/or a second working implement through the medium of a quick-attachment means provided with locking means, either directly or indirectly through the medium of a function device for instance, wherein at least the first working implement, for instance an excavating bucket, includes coupling means for detachable locking coaction with the quick-attachment means, wherein the second working implement (25) includes pressure-medium activatable gripping arms and an attachment part which has mutually opposing coupling means, wherein the coupling means located on one side of the attachment part are complementary to and therewith detachably connectable to the coupling means of a first working implement, for instance an excavating bucket, or a function element, such as a so-called rototilt, and wherein the coupling means on the opposite side of the attachment part are complementary to and therewith detachably connectable to the coupling means of the quick-attachment means, said arrangement being such that in one position the quick-attachment means and its associated locking element will function to lock the first working implement to the second working implement and therewith form an individually separable three-component assembly, characterized in that the second working implement (25) carries on one side thereof securing means (26, 28, 29) for releasably securing the coupling means (11) of the first working implement (10), wherein the pivotal gripping arms (34, 35) of the second working implement are adapted so that when in their passive state they will enable the first working implement to be secured by mutual coaction of said securing means (26, 28, 29) while at the same time preventing said arms from being swung outwards, and wherein when in an activated state the gripping arms (34, 35) function to prevent the first working implement (10) from being secured.

AMENDED SHEET (ARTICLE 19)

2. An arrangement according to Claim 1, characterized in that the coupling means for releasable coaction with the coupling means (11) on the first working implement has the form of a U-shaped groove or channel (26, 28, 29).

5

3. An arrangement according to Claim 1 or Claim 2, characterized by a guide curve (34" and 35") located at respective ends of the gripping arms (34, 35) of the second working implement (25), said guide curves when in a first position functioning to activate a respective displaceable cotter pin (40 and 41) so as to block entry to the U-shaped groove or channel (26) and when in a second position to allow entry to said U-shape groove or channel.

4. An arrangement according to Claim 3, characterized in that the cotter pins (40, 41) are spring loaded.

5. An arrangement according to any one of the preceding Claims, wherein the quick-attachment means includes a conically shaped locking shoulder which is mounted on one end of a movable rod and which is adapted to coact with the hook-like element on the first working implement, characterized in that the locking shoulder (20) has on opposite sides thereof guide means (21, 22) adapted for coaction with the flanges (28, 29) on the attachment part provided with said gripping arrangement (25).

6. An arrangement according to Claim 5, characterized in that the locking shoulder (20) is mounted on a rod (19) and accommodated in a guide means.

7. An arrangement according to Claim 6, characterized in that the locking shoulder (20) can be retracted to a first position in which the quick-attachment means and the second working implement (25) can be detached from the first working implement (10) in the form of a unit.

AMENDED SHEET (ARTICLE 19)

8. An arrangement according to Claim 6 and Claim 7, characterized in that a reinforced hydraulic line is passed through the rod and locking-shoulder guide means (23) and forms thereby means for limiting movement of the rod (19).

5

9. An arrangement according to any one of the preceding Claims, wherein the coupling means on the first working implement includes a carrier shaft which is intended for coaction with claws on the quick-attachment means and with the attachment part provided with said gripping arrangement, characterized in that the carrier shaft (12) is constructed to support the claws of respective implements in pairs and to control the pivotal movement of said claws.

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AMENDED SHEET (ARTICLE 19)

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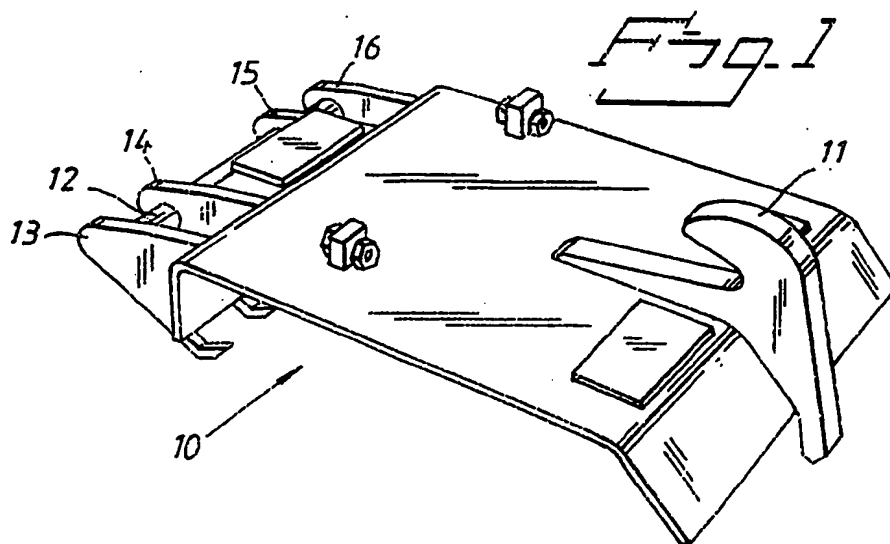
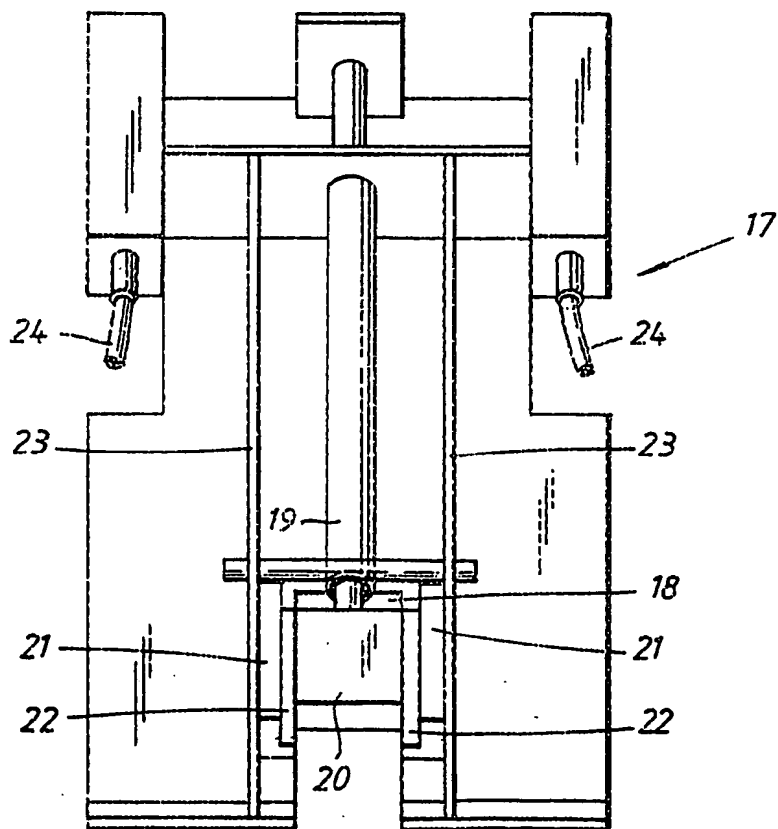


Fig. 2



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Fig. 3

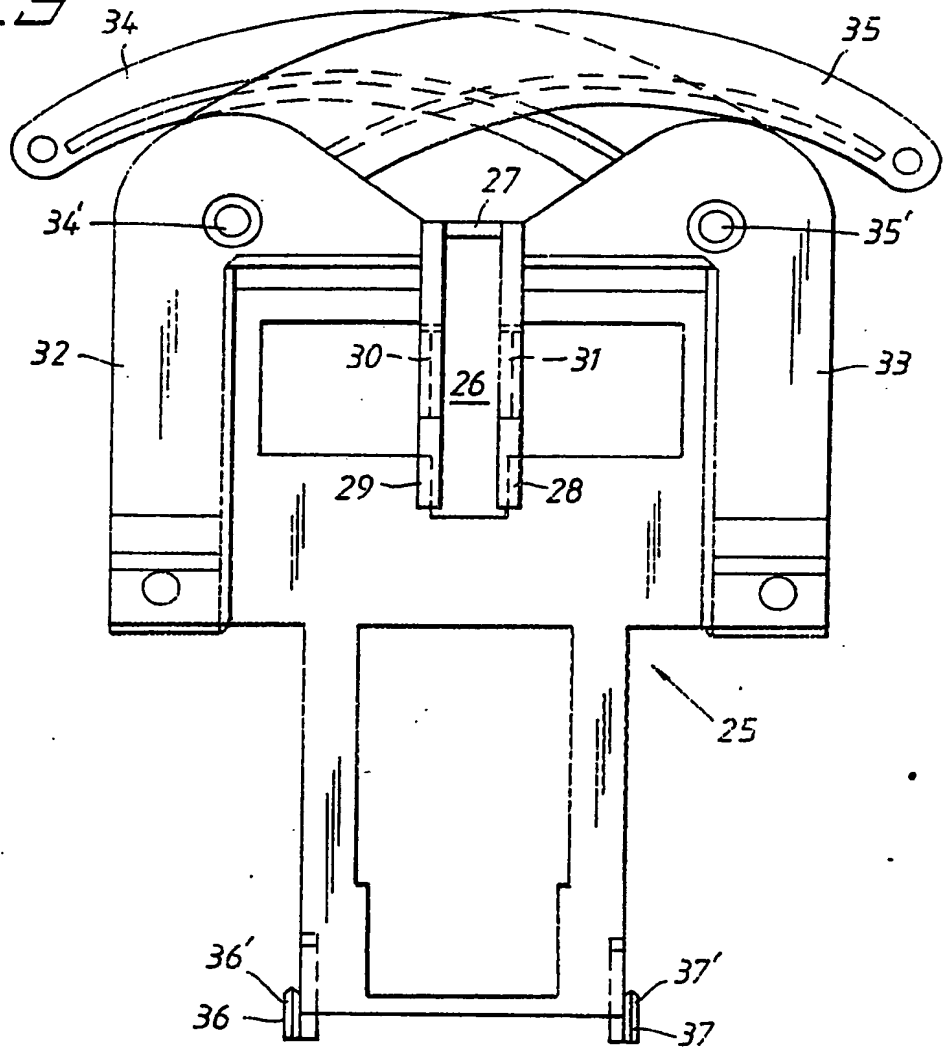
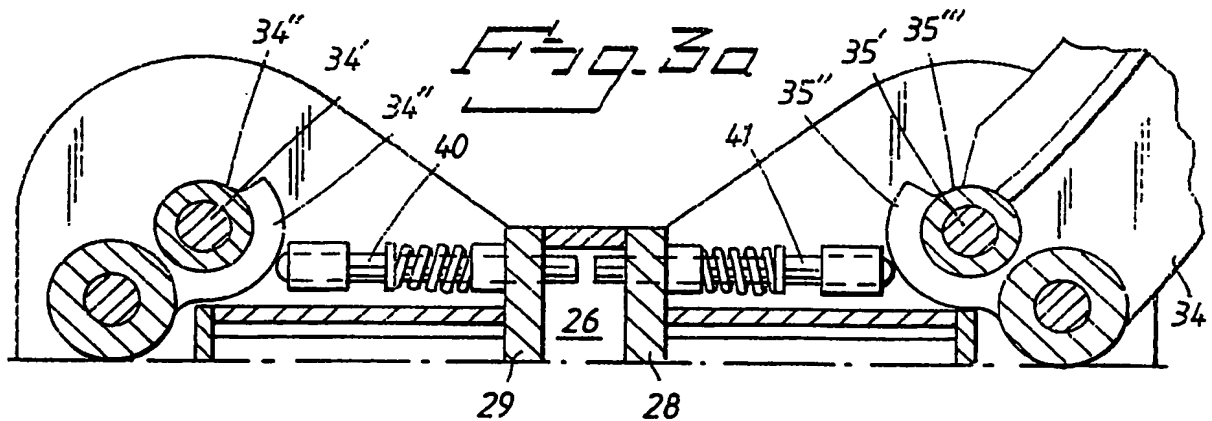
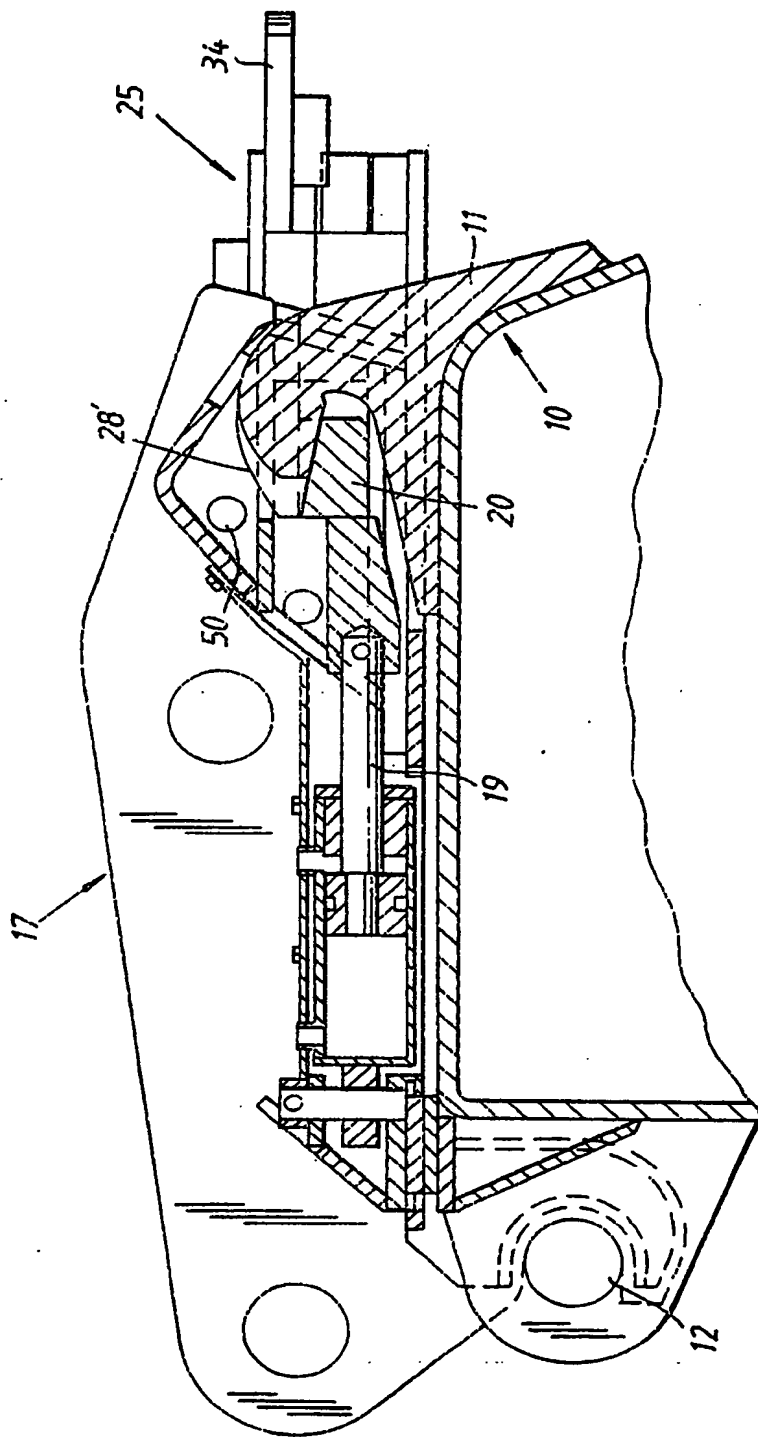


Fig. 3a

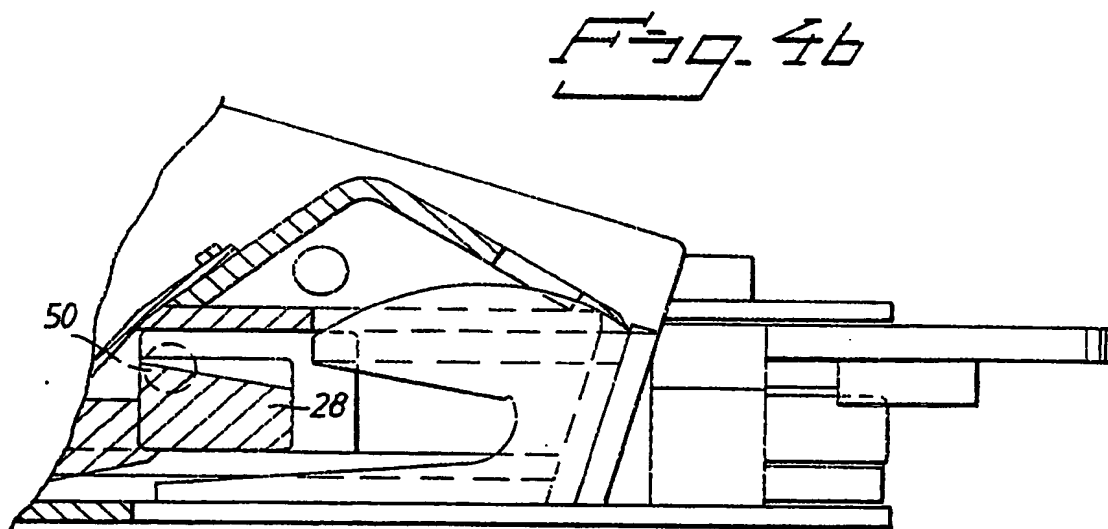
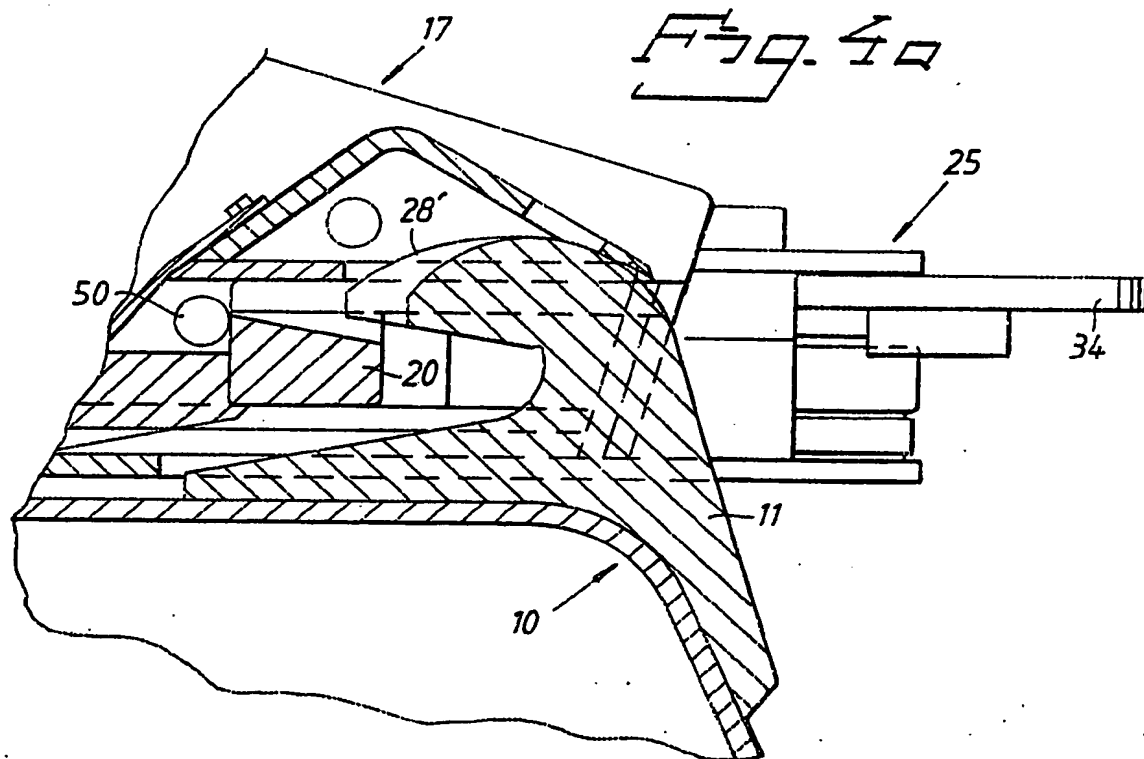


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Fig. 4



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INTERNATIONAL SEARCH REPORT

International application No.

PCT/SE 94/01217

A. CLASSIFICATION OF SUBJECT MATTER

IPC6: E02F 3/36, E02F 3/96

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC6: E02F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

SE,DK,FI,NO classes as above

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	SE, B, 464645 (SANDCO MASKIN AB), 27 May 1991 (27.05.91) --	1,3,4
A	WO, A1, 8001393 (WESTBERGS I BOLLNÄS AB), 10 July 1980 (10.07.80) -- -----	1-14

☐ Further documents are listed in the continuation of Box C.☒ See patent family annex.

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Date of the actual completion of the international search

7 March 1995

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INTERNATIONAL SEARCH REPORT
Information on patent family members

09/02/95

International application No.
PCT/SE 94/01217

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
SE-B- 464645	27/05/91	EP-A- 0534960 SE-A- 8902796 US-A- 5237762 WO-A- 9102852	07/04/93 23/02/91 24/08/93 07/03/91
WO-A1- 8001393	10/07/80	AT-T- 4335 EP-A,B- 0023495 SE-B,C- 428138 SE-A- 7900040	15/08/83 11/02/81 06/06/83 04/07/80

Form PCT/ISA/210 (patent family annex) (July 1992)